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Zeitschrift für Physik

Neu eingegangene Arbeiten

G. Kerker and K. H. Bennemann, Institut für Theor. Physik, Freie Universität Berlin:
Theory for Superconductivity in Amorphous Transition Metals

A theory is presented for superconductivity in amorphous transition metals. It is shown that in contrast to simple metals for transition metals the changes in the phonon spectrum, in the electronic density of states and in the electronic matrix elements which result from strong lattice disorder can enhance as well as decrease T_c. The numerical results for the superconducting transition temperature T_c of amorphous $4d$- and $5d$-transition metals agree well with the experimental results.

H. Wolters, Institut für Theoretische Physik der RWTH Aachen:
Verbesserung der Kubo—Theorie für die lineare und lokale Suszeptibilität (Improvement of the Kubo—Theory for the Linear and Local Susceptibility)

We use the Kubo-Theory to derive a correlation-function formula for the local susceptibility of a dielectric with regard to the internal fluctuating electro-magnetic fields in matter. The hamiltonian of the coupled system of field and matter is rewritten into a form, that it includes only operators which relate to volume elements with many atoms. The interaction between different volume elements and with it spatial dispersion is neglected. The possible energy levels in each volume element are approximated by an oszillator model. The difference between the local susceptibility and the response function to an external field, which is calculated in the usual Kubo-Theory, is shown.

Günter Franck, OSRAM-Studiengesellschaft München,
Jörg Elsner, Sektion Physik der Universität München:
Isotopic Effects in the Establishment of Thermal Equilibrium of Stationary H_2- and D_2-Glow Plasmas

In stationary glow plasmas, thermal equilibrium of the electron gas with the neutral gas is established, if, with increasing gas pressure, the diffusion lifetime of plasma electrons becomes high enough. In D_2-plasmas, thermal equilibrium sets in at higher pressures than in H_2. Equal electron temperatures are measured in H_2- and D_2-glows, if the corresponding gas pressures are in the ratio $p_{D_2}/p_{H_2}=1.22$. This isotopic effect of electron temperature and of thermal equilibrium is compared with calculations of the Boltzmann equation, taking into account the influence of ambipolar diffusion on the electron velocity distribution. There is a good agreement between measurement and theory.

G. Schmidt and L. M. Simons, Institut für Strahlen- und Kernphysik der Universität Bonn:
Measurement of the Parity Mixing of the 501 keV Transition in ^{180}Hf by Use of a Backscattering Polarimeter

The circular polarization of the 501 keV gamma radiation in ^{180}Hf was remeasured by use of a Compton backscattering polarimeter with the single pulse counting technique. The result $P_c=-(1.9\pm0.6)\cdot10^{-3}$ confirms the strong parity mixing which was previously reported by other groups.

Richard V. Denton, Institut für Theoretische Physik, Universität zu Köln, Köln, Germany:

On Size Corrections to the Diamagnetic Susceptibility of a Free Electron Gas

The magnetic behavior of spinless electrons confined in a cylinder of radius R by a harmonic oscillator potential is calculated over the entire range of sizes R/r_H, where r_H is the radius of the classical electron orbit due to a constant magnetic field H. The magnetic moment is shown to be large and positive in the small size limit $R/r_H \ll 1$ in agreement with recent experimental work, while in the usual large size limit $R/r_H \gg 1$ the Landau susceptibility is obtained. The model is compared with a similar calculation in which a periodic boundary condition is applied in order to show explicitly how qualitative differences arise in the small size limit, and the relevance of the results to calculations for rectangular and spherical geometries with hard wall boundary conditions is examined.

F. Freund, Institut für Experimentalphysik der Ruhr-Universität Bochum:

Innere Konversion der 161 keV- und 223 keV-Übergänge in ^{133}Cs (Internal Conversion of the 161 keV- and 223 keV-Transitions in ^{133}Cs)

Using a Ge(Li)−Si(Li)-spectrometer the 161 keV and 223 keV transitions of ^{133}Cs were investigated. The K-conversion coefficients were deduced to be $\alpha_K = 0.205 \pm 0.007$ and $\alpha_K = 0.0743 \pm 0.0043$, respectively. The K/L ratio for the 161 keV transition is 4.72 ± 0.37. From the α_K-values, $M1$ penetration factors of $\lambda = 8.6 \pm 3.4$ and $\lambda = 7.8^{+3.0}_{-2.8}$ were deduced which are inconsistent with known data from angular correlation experiments ($\lambda = 40 \pm 10$ and $\lambda = 90 \pm 13$). The penetration factor from K/L-measurement for the 161 keV-transition is $\lambda = 52 \pm 19$. A theoretical reinvestigation of the formulas used in the literature appears recommendable. Furthermore, the K/L ratio of the 1770 keV transition of ^{207}Pb was determined experimentally to be 5.52 ± 0.54.

J. Brecht, J. Kowalski, G. Lidö, I.-J. Ma and G. zu Putlitz, I. Physikalisches Institut der Universität Heidelberg:

Lifetimes and g_J Factors of $6s\,7p$ and $5d\,6p$ Levels of Ba I

Excited states of Ba have been investigated with optical double resonance and Hanle effect. The following g_J factors and natural lifetimes (in 10^{-9} sec) have been measured

$$6s\,7p \begin{cases} {}^1P_1 : g_J = 1.003(2) & \tau = 13.5(6) \\ {}^3P_1 : g_J = 1.4971(8) & \tau = 85.0(8.0) \end{cases}$$

$$5d\,6p \begin{cases} {}^1P_1 : g_J = 1.004(2) & \tau = 12.4(9) \\ {}^3P_1 : g_J = 1.4847(15) & \tau = 11.7(9) \\ {}^3D_1 : g_J = 0.5064(3) & \tau = 17.0(5). \end{cases}$$

g_J is utilized to test the mixing coefficients of the wave functions in the intermediate coupling model. The lifetimes are converted into absolute transition probabilities for all the decays originating from the states investigated under the assumption that their branching ratios obtained elsewhere are correct. This assumption is not unquestionable, however.

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$\Gamma, \Delta, \Theta, \Lambda, \Xi, \Pi, \Sigma, \Phi, \Psi, \Omega, \quad \alpha, \beta, \gamma, \delta, \varepsilon, \zeta, \eta, \vartheta, \iota, \kappa, \lambda, \mu, \nu, \xi, o, \pi, \rho, \sigma, \tau, \upsilon, \varphi, \phi, \chi, \psi, \omega$

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$\mathcal{A}, \mathcal{B}, \mathcal{C}, \mathcal{D}, \mathcal{E}, \mathcal{F}, \mathcal{G}, \mathcal{H}, \mathcal{I}, \mathcal{J}, \mathcal{K}, \mathcal{L}, \mathcal{M}, \mathcal{N}, \mathcal{O}, \mathcal{P}, \mathcal{Q}, \mathcal{R}, \mathcal{S}, \mathcal{T}, \mathcal{U}, \mathcal{V}, \mathcal{W}, \mathcal{X}, \mathcal{Y}, \mathcal{Z}$

$a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z$

blue = Gothic:

$\mathfrak{A}, \mathfrak{B}, \mathfrak{C}, \mathfrak{D}, \mathfrak{E}, \mathfrak{F}, \mathfrak{G}, \mathfrak{H}, \mathfrak{I}, \mathfrak{J}, \mathfrak{K}, \mathfrak{L}, \mathfrak{M}, \mathfrak{N}, \mathfrak{O}, \mathfrak{P}, \mathfrak{Q}, \mathfrak{R}, \mathfrak{S}, \mathfrak{T}, \mathfrak{U}, \mathfrak{V}, \mathfrak{W}, \mathfrak{X}, \mathfrak{Y}, \mathfrak{Z}$

$\mathfrak{a}, \mathfrak{b}, \mathfrak{c}, \mathfrak{d}, \mathfrak{e}, \mathfrak{f}, \mathfrak{g}, \mathfrak{h}, \mathfrak{i}, \mathfrak{j}, \mathfrak{k}, \mathfrak{l}, \mathfrak{m}, \mathfrak{n}, \mathfrak{o}, \mathfrak{p}, \mathfrak{q}, \mathfrak{r}, \mathfrak{s}, \mathfrak{t}, \mathfrak{u}, \mathfrak{v}, \mathfrak{w}, \mathfrak{x}, \mathfrak{y}, \mathfrak{z}$

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also the handwritten Roman letters:

$$c, C; \quad k, K; \quad o, O; \quad p, P; \quad s, S; \quad u, U; \quad v, V; \quad w, W; \quad x, X; \quad z, Z; \quad e, l;$$

the symbol *a* and the indefinite article a:

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Notations

preferred form	instead of
$\exp\left(-(x^2+y^2)/a^2\right)$	$e^{-\frac{x^2+y^2}{a^2}}$
$7/8, (a+b)/c$	$\frac{7}{8}, \frac{a+b}{c}$
$\frac{\cos(1/x)}{(a+b/x)^{1/2}}$	$\frac{\cos\frac{1}{x}}{\sqrt{a+\frac{b}{x}}}$
f^{-1}	$\bar{f}^{1}$

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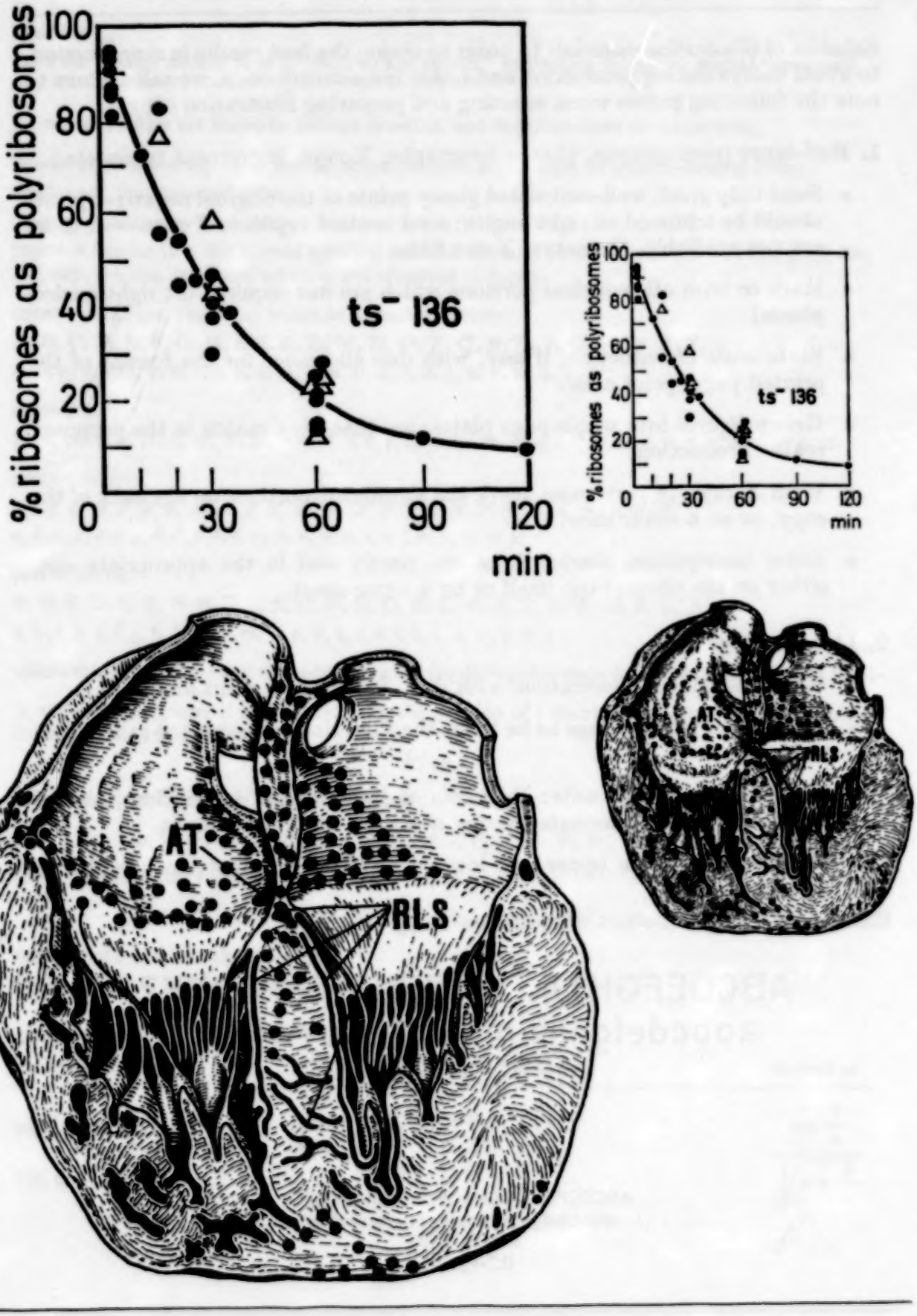

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Quasielastic Neutron Scattering for the Investigation of Diffusive Motions in Solids and Liquids

By Professor Dr. **Tasso Springer,** Institut für Festkörperforschung der Kernforschungsanlage Jülich

With 36 figures. II, 100 pages. 1972
(Springer Tracts in Modern Physics/ Ergebnisse der exakten Naturwissenschaften, Vol. 64)
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